APICULTURE

SPECIES OF HONEYBEE
- *Apis dorsata*
- *Apis florea*
- *Apis indica* (oriental honeybee)

IMPORTANT CHARACTERS OF HONEYBEE
Castes of honeybee:-
- Queen
- Drones
- Workers

QUEEN
- She develops from a fertilised egg and a larva fed on royal jelly, a secretion from the mouth of nursing workers.
- She is the largest among the 3 castes.
- Her only duty is to lay eggs and she is the mother of almost entire colony.
- She is unable to form hive, to collect food and to produce wax.
- She is permanently waited by the workers.
- She lives for several years.

DRONES
- They develop ***parthenogenetically*** and only serve to mate with the queen.
- Only one drone gets the chance to mate with the queen and the selection is made by a nuptial/marriage flight.
- The drones do not work in the hive.
- They are fed by the workers.
- They are intermediate in size among the 3 castes.
- They have a short life-span.

WORKERS
- They develop from fertilized egg and perform a variety of duties which justify their name.
- The old workers visit fields, gardens and orchards, they are called ***outdoor*** or ***fieldworkers***. They gather and bring nectar, pollen, resin (gum) and water to the hive.
- Young workers stay in the hives and termed as ***housebees***. Among the house bees are:-

1. **STORE KEEPERS**: Receive the material brought by the outdoor workers to store the supplies in the cell.
2. **BUILDERS**: Construct wax cells.
3. **REPAIRERS**: Plug crevices between the cells.
4. **CLEANERS**: Remove dead and waste materials.
5. **FANNERS**: Ventilate the hive by beating their wings.
6. **GUARDS**: Defend the colony.
7. **NURSES**: Feed the larvae, drones and queen.
8. **WAITERS**: Attend the queen.

- During winters, the worker bees huddle together in a mass in the hive. Life is sustain by heat produced in beating the wings and by taking honey.

LIFESTYLE
Study of bees is called *Apiology*, and a person who specialises in bees is termed as *apiologist*.

FOOD COLLECTION
NECTAR
- It is the sugary secretion in the flowers.
- It is drawn by the workers with the help of a sucking tube formed by their mouth parts.
- It is swallowed into a large sac, the ***crop or honey sac.***
- In crop, the sucrose of the nectar is acted upon by the enzymes present in the saliva secreted by honey bee, and changed into glucose, levulose and fructose, which are readily assimilate by man.
- On returning to hive, the workers regurgitate the hydrolysed nectar into the storage cells and further changed chemically in the mouth of young workers who stay home.
- The fanners then evaporate excess of water from the sweet fluid by vibrating their wings.
- The final concentrated product is honey. The cells containing honey are now sealed with wax lids and they are opened at the time of need.
- Honey is the principal food of the adult bees and the larvae.

POLLEN
- As the workers suck nectar from flowers, the hair covering their entire body get smeared with pollen from the anthers.
- The body is cleaned of the pollen with ***pollen brushes*** present on all the three pairs of legs.
- From these brushes, the pollen is finally transferred into ***pollen baskets*** formed on the hind legs.
- On return to the hive, the workers push the loads of pollen into storage cells with the assistance of young workers.
- A special food made by mixing honey and pollen, sometimes called "***bee bread***", serves as an excellent source of protein for the developing larvae.

SWARMING
- Swarming occurs in late spring or early summer.
- It purpose is to relieve overcrowding in an old colony and to found new colonies.
- Preparatory to swarming, several queen and numerous drone cells are constructed and eggs laid in them.
- On a fine forenoon, the old fertilized queen leaves the hive and flies away accompanied by a large number of old workers and drones in the form of a dense mass with the queen in the middle.
- Finding a suitable place, apparently at a signal from that queen or royal nurses, the swarm settles and constructs a new hive.
- The old colony is left with young workers and developing queens and drones.
- The queen that emerges first takes charge of the colony. She stings to death other developing queen pupae as a queen does not tolerate a rival in the hive.
- She is induced to do so by the "***royal nurses***".
- If two queens emerge at the same time, there is a fight to the death, the victor becoming the new queen.

NUPTIAL/MARRIAGE FLIGHT
- About a week after her emergence, the new queen flies out of the hive. She is followed by the drones. She flies very high. The drones gradually drop out of the race. The last survivor reaches her and mates with her in midair. She lays eggs for 5 years of her life then and she mates only once.
- After mating the drone dies. Queen returns to the hive and in about 3 days after mating the queen starts laying eggs. She doesn't leave the hive, until she grows old and leads a swarm to found a new colony.
- The queen lays about 1000 eggs per day till 4-5 years of her which means she can lay about millions of eggs in her lifetime. The queen controls the fertilization of the eggs, the unfertilized eggs develop into haploid drones. Toward the end of her life, she is killed by her own nurses to make way for new queen.

HIVE OR COMB BUILDING
(There are no cells for the adults which keep clustering or roaming about on the surface of the hive.)
- The hive is build by the workers out of wax secreted by special glands present in abdomen.
- The wax collects in the form of small flakes on the undersurface of the abdomen.
- From here, the flakes are removed by the hind legs and passed on to the jaws.
- The jaws convert the wax flakes into a plastic material by masticating and mixing them with secretions of cephalic glands and mould the plastic material into cells.
- Crevices between the cells are cemented with propolis, a sticky resin collected by the workers from the plant buds.
- The chambers are polished with balm, a special type of propolis, before use.
- Once built, the hive is used for many years.
- The various chambers are periodically cleaned, repaired and polished for reuse.

STORAGE CELLS
About 5 mm wide and commonly lie in the upper portion of the hive and used for storing honey and pollen.

BROOD CELLS
Occupy the central and lower portion of hive, used for rearing brood and are of 3 types:

WORKER CELLS
They are of size of storage cells and are used for rearing the workers. They lie horizontally in the hive.

DRONE CELLS
They are 6 mm wide and are used for bringing up the drones. They are also horizontal in position.

QUEEN CELLS
They are still larger and are used to rear the queens. They may be cylindrical or vase like in form and are vertical in position.

COMMUNICATION
Information is transmitted either by *pheromones* during many licking and grooming activities called *trophallaxes*, or by particular forms of visual orientation displays known as ***dances***. Recent studies has suggested that bees use high-frequency sound to communicate sources of food to other workers.

BEE ENEMIES
War moths, wasps, black ants, bee-eaters and kingcrow. The animals that eat up honey bees are said to be *Apiverous*

SYSTEMATIC POSITION
Sub-Family - Apinae
Family - Apidae
Order - Hymenoptera
Division - Endopterygota
Sub-Class - Pterygota
Class - Insecta

BEE DISEASES
Nosema Disease: Caused by a **sporozoan** *Nosema apis*.
Dysentry, Paralysis and acarine disease: Caused by a **parasitic mite** *Acarapis woodi*.
(*Nosema apis*) lives in the epithelial cells of the digestive tract of honey bees. It's infection occurs by the ingestion of spores.)